

# AAAS *Bulletin*

American Association for the Advancement of Science

November 1961

## The John Wesley Powell Lecture



► John Wesley Powell, who was president of the AAAS in 1888, won the first big fight to keep government scientific activities out of military hands, and he would have been delighted to know that scientific enterprise on a scale undreamed of in his century is the beneficiary of his efforts. We owe a number of other things to Powell, and the debt is acknowledged each year by the John Wesley Powell Memorial Lecture given at the meeting of the Southwestern and Rocky Mountain Division. This year the Division will present the Powell Lecture as a major event of the AAAS Annual Meeting in Denver in December.

Colorado was Powell's country. He stopped in Denver, with his group of 16 students and scientific amateurs, to seek advice for his first venture into the "majestic mountains" and "everflowing rivers" to which he would give the rest of his life. Powell was 33; he had left an arm on a Civil War battleground (but nevertheless had managed to pick fossils out of the Vicksburg trenches with the other one). He already knew that a comfortable berth as a geology professor at Illinois State Normal University was not enough, and he had secured \$1700 worth of railroad passes and the backing of General Grant himself to bring his little band of specimen-collectors to the Rockies. So Mrs. Powell climbed Pikes Peak in a green

veil and three petticoats, and John Powell got his first good look at a hundred square miles of geology.

It took two years of planning and a winter-long camp in Colorado's White River valley to launch Powell and his four boats on the exploration of the Colorado River. Competence in his scientific field helped him dare the unknown course of the "saw that cut the mountains."

"The canyon was old enough," he wrote, "and the muddy river swift enough and gritty enough to have worn down all falls to mere rapids." Nevertheless the twisting 800-mile course was perilous enough to persuade three of Powell's ten men to abandon the party and climb the face of the canyon where they died by Indian arrows.

Powell lived to read his premature obituary notices in Salt Lake City and to turn in his magnificent journal as his official report of the exploration to a grateful government. Powell's *Exploration of the Colorado River of the West* may be the only U.S. government report to have become popular reading; within the last four years it has been printed in two editions, including a recent paperbound one by Doubleday, and has provided the basis for a movie, *Ten Who Dared*, released last year by Walt Disney.

The Powell Memorial lecture has never been a better reminder of what we owe to Powell and the other mem-

bers of the National Academy of Science who saw to it that the "scientific works of the General Government" did not "fall out of the hands of scientific men"; this year the Powell lecture will be given by the scientist who runs the \$2.7 billion affairs of the Atomic Energy Commission.

Powell's budget at the U.S. Geological Survey never got much above a half-million dollars a year, but this was enough to make the Survey the world's largest scientific organization and to make Powell both the most influential scientist of his day and a sort of perpetual target for certain Western senators. It took them 13 years to bring him down, with charges of wasteful studies of "toothed birds" among other matters, and in those years Powell showed what government scientific investigation, wisely managed, could contribute to the national welfare.

Before the National Academy of Science persuaded Congress to establish the U.S. Geological Survey in 1879, several competitive land surveys were being operated by the government. Millions of dollars had been needlessly spent in surveying the country by chain and compass instead of by triangulation. Land titles rested on stakes in the ground, and when these were lost, both states and individuals plunged into bitter litigation.

#### The Useless Facts Piled Up

"The records of the Land Office furnish a gigantic illustration of the evils of badly directed scientific work," Powell told a Congressional investigating commission. "A large corps of surveyors has been employed for nearly a century. Forests, prairies, plains and mountains have been traversed in many directions; chart after chart has been constructed with great labor; folio on folio has been placed among the national archives . . . and so the records of useless facts have piled up from year to year until they are buried in their own mass. . . . All of this labor and expense has been lost to science."

Powell used to say that "the fool collects facts; the wise man selects them," and in a series of brilliant reports as head of the Geological Survey he showed what he meant. These were busy years in which he also served as vice-president and president of the AAAS and founded the Cosmos Club "to provide an opportunity for social intercourse among men of science and letters in Washington." (It was at the Cosmos Club that he and Simon Newcomb met to devise an air-cooling system for the room where President James Garfield slowly died from the assassin's bullet.)

One of Powell's reports as director of the Geological Survey was his great dream of scientific land use: a proposal to reclaim the arid lands of the west by a master plan linking hydroelectric power development, flood control, irrigation and soil conservation. He urged that the Survey be given authority to study the whole area and designate for settlement only those lands suitable for irrigation. This prudent proposal would have forestalled the return eastward of a good many wagon trains under banners reading "In God We Trusted; in Kansas We Busted." But the plan ran aground on the homesteader

fever of the day, and western cattle and lumber men had no difficulty in mobilizing Congress for support of every man's right to a piece of the frontier—no matter how dry this turned out to be.

Powell's Congressional antagonists finally succeeded in crippling the U.S. Geological Survey, and he resigned in 1894, to spend the rest of his life working with the rich supply of ethnological material he had collected at Indian campfires and in beginning a grand outline of science.

In the last summer of his life, Powell saw his government make a start on his great dream for the Western lands: "justice and happiness guaranteed by science." Theodore Roosevelt established the Reclamation Bureau in 1902, but not until the great dust bowls of the thirties had aroused the nation was hydroelectric power development fully allied with the planned use of land as envisioned by Powell a half-century before.

Those of us who fly to the Annual Meeting in Denver in December will probably be able to see some of the results of the alliance of science and government formed in the vigorous years of the confident 19th century: great public power authorities now curb the turbulent rivers of the U.S. and have turned many square miles of desert into fertile valleys. The Colorado, which Powell rode to fame, is now harnessed by a stairway of great dams, and more than 10 million persons in seven states and in Mexico depend on it for water and power. In the Colorado's upper basin, three more dams are under construction: Glen Canyon (which will add Lake Powell to the Utah wilderness), Flaming Gorge and Navajo. Perhaps, as we look down from the air on the magnificent realization of this 19th century beginning, we can be permitted the hope that it may take no longer than another half-century to reach another of Powell's dreams: the time "when society shall have passed to complete integration in the unification of nations."

For facts about Powell's life, we are indebted to the fine biographies by Wallace Stegner and William Darrah and to our own librarian, Sarah Dees. Stereoscope view on the cover is from Powell's first report.

## For Every Man and Nation

► Vesalius and Paré consulted over the bedside of a dying king; Faraday and Davy met with Ampère under the guns of Napoleon. It has seldom been possible to divide the international community of science by the walls of either geography or politics. The principles of the Antarctica Treaty were made possible by the successful cooperative research of scientists of many countries, and these provide at least a glimmer of hope that the costly race in space may yet be turned into a united scientific effort to add to the common stock of knowledge.

Although Soviet nuclear weapons were exploding in the international air, scientists representing eleven nations at the Stowe Conference in September nevertheless managed to outline some major areas for international cooperation in science. These were described in detail in

*Science* 6 October 1961, where geneticist Bentley Glass, one of our directors and a participant in the Conference, wrote that the conferees also reached a working agreement on how to stop production of nuclear weapons and how to begin disarmament far exceeding "in extent of agreement and explicitness the former bases of negotiations at Geneva."

In late September another forum, the International Council of Scientific Unions, met in London, where delegates considered in concrete and practical terms some of the ambitious objectives outlined at Stowe.

The Council's membership is composed of representatives of 50 national academies of science and of 13 inter-

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*As men learn the lesson of science, of the value of unbiased and diligent search for the truth, may we not hope that scientific investigation may displace war as a method for solving our great human problems?*

—Arthur H. Compton

*AAAS Bulletin, April 1942*

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national scientific unions, some of which were organized as early as 1919 by scientists in a number of countries who already knew each other by correspondence, exchange of publications, etc.

U.S. delegates sent to the London meeting by the National Academy of Sciences were:

Detlev Bronk, Rockefeller Institute and Academy president; Robert Eldersfield, University of Michigan; Joseph Kaplan, University of California; Harry C. Kelly, National Science Foundation; Robert F. Loeb, emeritus, Columbia University; Homer E. Newell, National Aeronautics and Space Administration; Roger Revelle, Scripps Institute of Oceanography; A. H. Shapley, National Bureau of Standards; Paul Weiss, Rockefeller Institute; and Wallace M. Atwood, director of the Academy's office of international relations.

The International Union, which changed its name to the more appropriate International Council of Sciences at this recent and ninth assembly, agreed to go to work on an International Biological Program. Since the Council is the successful organizer of the International Geophysical Year, we can expect this new endeavor to make a brilliant contribution in a field where human needs are urgent. The program is scheduled to begin in 1963, and the present plan covers three main lines of study: human genetics, the biological stresses of societies in transition (e. g., introduction of modern agricultural techniques), and improvement of the world's food supply by pooling the new knowledge of plant and animal genetics. Biologists have been invited to submit ideas for specific projects.

The Council has also organized a Committee on Space Research, to which 16 national academies of science, including those of the U.S. and U.S.S.R., belong. One of the first efforts of the Committee is to see to it that bands in the frequency spectrum are allotted among competing

uses so that research in radio astronomy and space science will not be handicapped.

Two years ago some 1100 scientific sailors from 54 countries met, appropriately, at the United Nations headquarters, to share knowledge of the "oceans, which are the property of no man, and no nation but the heritage of every man and every nation."

This reminder comes from Roger Revelle who also said in an introduction to *Oceanography*, the volume reporting this conference recently published by AAAS:

"By the ironies of science in our terrible century, the very existence of our human species is threatened while at the same time populations everywhere are exploding in size. No one knows how to predict or control what will happen to human society. We do know we must learn to govern our planet, to accept rationally and use wisely the planetary home in which all men are imprisoned. A first step in planetary government might well be the development of a wise and far-seeing international government of the oceans."

The oceanographic conference was organized by AAAS and sponsored jointly by the International Council of Sciences and by UNESCO.

The International Council has already begun work on international exploration of the 28-million square miles of the Indian Ocean. An international meteorological center will be established at Bombay. The U.S. will supply 10 of the 40 ships to be used and \$150 million in funds.

Another worldwide assembly is the International Association for Quaternary Research, which met in Poland in September. A 15-member delegation from the U.S. attended this geological congress, with travel funds provided by the National Science Foundation. Gerald M. Richmond, U.S. Geological Survey, Denver, was chairman of the delegation, and two members nominated by AAAS, at the invitation of the National Academy of Sciences, were: Richard J. Russell, Louisiana State University, and Terah L. Smiley, University of Arizona. The Association accepted the invitation extended by U.S. delegates to hold their seventh congress in this country in 1965.

We hope you may find the Annual Meeting next month in Denver an opportunity to join the international conversations of science. A number of the men who have participated in these worldwide meetings will attend the Annual Meeting, and some of the problems attacked by these conferences will be covered in the AAAS program. Meeting with us will be representatives of at least two scientific associations in other countries, while British scientists will participate in symposiums on present levels of radioactivity and the biochemistry of genetics.

## How to Live with Fallout

► While some 130 high school science teachers in the Washington, D. C. area attended a five-day course on radioactivity and isotopes, local scientists took their places in classrooms as guest lecturers. Another scientific team gave the teachers lectures and laboratory work



in space provided by the Carnegie Institution of Washington.

This pattern-setting scientific service in the public interest was the idea of Philip H. Abelson, who is president of the Washington Academy of Sciences, a member of the general advisory committee to the Atomic Energy Commission, director of the Carnegie geophysical laboratory, and a member of the AAAS Council. The Institute was sponsored by the Washington Academy and the Joint Board on Science Education. Government and industrial laboratories contributed isotopes, radiation detection and other equipment, and Ralph T. Overman of the Oak Ridge Institute of Nuclear Studies organized the curriculum. Said Dr. Abelson:

"Attaining a maximum capability of living with radioactivity is one of the most important problems facing the nation today. Unfortunately the present level of knowledge throughout the citizenry is extremely low.

"The practical mechanism for teaching almost any subject is through the schools. . . . But only a few high schools are capable of giving such training. In part the deficiency is in equipment, but principally the problem is lack of trained instructors. . . . A desirable objective is that at least one teacher in each high school of the nation should be capable of giving instruction in radioactivity. The essential information could then be disseminated if the knowledgeable instructor taught other teachers and also the students."

Both Dr. Abelson and Dr. Overman hope that the teachers' institute conducted in Washington will serve as a model to other academies and scientific groups. Dr. Overman will provide outlines of the curriculum to interested groups, and requests may be sent to him at the Oak Ridge Institute.

## Research and Teaching

► *Science Education News*, a quarterly newsletter published by the AAAS Science Teaching Improvement Program, has been steadily accumulating readers since its advent in mimeographed form in 1955. Dr. John Mayor, director of the program, is not quite sure whether to attribute the circulation increase (from an initial 500 to over 4,000) to the editorial appeal of the publication or to the fact that the support of the Carnegie Corporation has

made it possible to mail it without charge to persons working in this field. At any rate, some letters seeking to subscribe are accompanied by checks, and, although these are conscientiously returned, the occasional appearance of ready cash reassures the editors.

The current issue of *Science Education News* makes a plea for more research experience for those who are preparing to teach science in secondary schools.

"Unless those who prepare to be

*Continued on page six*

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The American Association for the Advancement of Science, founded in 1848, offers membership both to professional scientists in all fields and to other men and women who have a general interest in science and who recognize its relation to human welfare.

Annual membership dues are \$8.50. Each member receives the *Bulletin* and *Science*, the scientific newsweekly established by Thomas A. Edison in 1880. *Science* includes reports of original research across the spectrum of the physical and biological sciences as well as news of scientists and their work.

Chauncey D. Leake, Past President and  
Chairman of the Board

Thomas Park, 1961 President

Dael Wolfle, Executive Officer

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## The BA and the Amateur

The AAAS has been represented by an officer or two at each of the recent annual meetings of the British Association for the Advancement of Science—usually known as the BA and sometimes, more informally and affectionately, as the British Ass. This year Thomas Park and I had that pleasure. The American visitor quickly finds that the similarity of organization and program that unite the BA and the AAAS masks some major differences in the annual meetings of the two organizations. Most apparent are the relaxed graciousness of a BA meeting, the pageantry of its formal sessions, and the number of students and amateurs who attend.

The many scientific sessions recess for morning coffee, afternoon tea, and an occasional garden party, and are broken off altogether on Saturday and Sunday for a wide variety of excursions to points of scientific, scenic, or historic interest.

The colorful Inaugural General Session on opening night features the presidential address. Invitations read "evening dress, academic dress, decorations." Black academic robes set off more vivid costumes: the distinctive hats and gowns of some European universities, the special garb of clerical and civic officials, the Lord Mayor's gold chains, and the medals and ribbons that decorate many a chest. The pageantry is repeated at a special service at the local cathedral, and, minus academic robes, at a civic reception, quite possibly held at a centuries-old castle.

Unlike the AAAS, which has a large continuing membership, membership of the BA changes from year to year, for many local residents—sometimes more than a thousand—join just for the year. And always there are hundreds—again sometimes over a thousand—of college and secondary school students.

Because the amateur interest in science seems to be more highly developed in Great Britain than in the U.S., and because a fundamental purpose of the BA is to take science to the people, some programs are specifically intended for amateurs or laymen. There are lectures for young people, evening addresses of general interest, the daytime sessions of the General Section, and the addresses of the presidents of the sections. But however a particular session is labeled, the audience is a mixed one. Senior scientists and local citizens attend lectures billed for students, and students sit through more technical sessions not specifically addressed to them. The amateur interest is particularly evident in sessions of the General Section. Lord Cranbrook, in his address as 1961 president of this section, discussed the role of the amateur in science, and, on another day, gave evidence that he is a good example of that topic by reading a paper on mammalogy. Lord Rennell of Rodd, diplomat, financier, former BA treasurer, amateur geographer, and former president of the Royal Geographic Society, was another distinguished amateur, as was the Bishop of Norwich, whose interests have ranged over geology, philosophy, and theology.

In the past half dozen years the BA has intensified its efforts to explain science to the public. In addition to the annual meetings, two or three day programs are arranged for student audiences in other cities and at other times. Local committees each year provide speakers for several hundred meetings of luncheon clubs and school, parents', labor, and other organizations. The BA is doing an increasingly effective job of public education, and in the process is helping to maintain an amateur interest in science. In this effort, the annual meeting remains as a fine example of easy, friendly communication between the senior scientists, the students, and the local citizens who spend a week together as members of the BA.

DAEL WOLFLE  
*Executive Officer*

teachers get a chance at the unforgettable experience of asking questions of nature instead of memorizing textbooks, they will not be able to open this experience to the generations of students who will pass through their classrooms."

The newsletter presents reports from professors of science who had received AAAS grants enabling them to undertake modest research studies and made possible by the Carnegie program. These men are all in small colleges where a large number of students are preparing to teach. The small grants were awarded with the understanding that undergraduates preparing to be science teachers would be used as research assistants.

The chief business of *Science Education News* is to report progress in the work in improvement of science education, which has been initiated by many of the professional scientific societies, by many university faculty groups, and by many organizations in the field of education. But the newsletter also has a few editorial crotchets: one is the premise that education need not be dull and another is a bias against the traditional lecture method of instruction. In support of both of these the current issue cited Charles Darwin, who wrote at 67:

"The instruction at Edinburgh was altogether by lectures, and these were intolerably dull, with the exception of those on chemistry by Hope; but to my mind there are no advantages and many disadvantages in lectures compared with reading."

Not long ago the AAAS board of directors voted to provide Association support for continued publication of *Science Education News*. The quarterly newsletter is now being mailed to the 421 members of the AAAS Council. Members who are particularly interested in the improvement of science educa-

tion may be added to the mailing list by request. Since we are, of course, anxious to avoid crowding your mailbox without some good reason, we shall appreciate your not requesting the publication unless it promises real usefulness for you.

## Chemists Join in Force

► The Association's net gain in membership for the year is now estimated at 6,380—more than twice the net gain of last year and more than four times that of the year before. A substantial part of this gain is the result of an increase in invitations to join: some 400,000 of these were mailed over the year to members of affiliated scientific societies and other groups (with the approval of the boards of these organizations). It is interesting to note that these letters of invitation have brought in large numbers of members from scientific fields other than the traditional AAAS nucleus of workers in the medical and biological sciences. Raymond L. Taylor, associate administrative secretary, tells us that among the new members who came in this year are 2,363 chemists, 467 science teachers, and 460 electrical engineers. Association membership now stands at 68,000.

While there have been good results from increased activity in mailing invitations, year after year recommendations by members remain the most fruitful source of new membership. Members quite naturally select others whose interests and attitudes are allied to their own, and to the objectives of the AAAS, and these people do in high proportion decide to become members. Won't you give a thought to those of your colleagues who would enjoy membership? If you will send us their names on a postcard, we shall send them in-

formation and the enrollment form. Perhaps you may find it convenient to pass along this copy of the *Bulletin*, which can serve as something of an introduction to the AAAS and its Annual Meeting.

News of the mammoth program of the Annual Meeting, which will open in Denver on 26 December, appeared in *Science* 27 October and will be found in succeeding issues. You may wish to post these pages of *Science* on your departmental bulletin board, so that colleagues who are not members may have a chance to consider attending.

## Do You Read Daedalus?

► "Excellence and leadership in democracy" is the theme of the fall issue of *Daedalus*, the stimulating quarterly published by the American Academy of Arts and Sciences. Among nine explorers of this theme is Don Price, who writes, among a great many other interesting things, that "it may now be clear, even to extreme conservatives, that it will require very great authority and administrative strength at the center of our government either to enforce economy against private demands for government spending or to direct that spending in the national interest."

We have seldom seen a journal that we found a more pleasant use of time, and we are happy to remind you that as an AAAS member you can receive *Daedalus* at a reduced rate of \$4.50 a year. Your subscription should be sent to the American Academy of Arts and Sciences, 280 Newton Street, Boston 46, Massachusetts. Arrangements for reduced rates with other journals of particular interest to AAAS members will be announced later.

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### American Association for the Advancement of Science

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